

Many passages of particular interest might be quoted from all of the chapters, but as the book to be appreciated must be read as a whole, we would rather commend it warmly to students of natural history and to those who would know of Britain's worthies. Thanks to the diaries kept by our earliest botanists and from the free use of contemporary information, the biographies are full of living personal interest. We can picture Robert Brown—facile botanicorum princeps, Britanniae gloria et ornamentum—all the more easily and truly from the human touches in the following extracts from his diary for two consecutive days:

"Feb. 7.—Before breakfast began the German auxiliary verbs. . . . At dinner about 3 pints of port . . . slept in my chair till nearly 3 in the morning.

"Feb. 8.—Before breakfast finished the auxiliary verb *Seyn*; to be. . . ." A. W. H.

PRACTICAL AND THEORETICAL PHYSICS.

- (1) *The Essentials of Physics*. By Prof. G. A. Hill. Pp. viii + 346. (New York and London: Ginn and Co., n.d.) Price 5s.
- (2) *Practical Measurements in Radio activity*. By Dr. W. Makower and Dr. H. Geiger. Pp ix + 151. (London: Longmans, Green and Co., 1912.) Price 5s. net.
- (3) *A Systematic Course of Practical Science for Secondary and other Schools*. By A. W. Mason. Book I., Introductory Physical Measurements. Pp. vii + 126. (London: Rivingtons, 1912.) Price 1s. 6d. net.
- (4) *Practical Physics: a Text-book for Technical Schools and Colleges*. By Angus McLean. Pp. xi + 402. (London: Adam and Charles Black, 1912.) Price 7s. 6d. net.
- (5) *A Course of Elementary Practical Physics*. By H. V. S. Shorter. Part i., Mensuration, Mechanics, Hydrostatics. Pp. 111. Price 2s. Part ii., Heat and Light. Pp. 216. Price 3s. (Oxford: Clarendon Press, 1912.)
- (6) *Lehrbuch der Physik für Mediziner und Biologen*. By Dr. Ernst Lecher. Pp. vii + 451. (Leipzig and Berlin: B. G. Teubner, 1912.) Price 8 marks.
- (7) *An Introduction to Mathematical Physics*. By Dr. R. A. Houstoun. Pp. ix + 199. (London: Longmans, Green and Co., 1912.) Price 6s. net.
- (8) *Die Elektrizität*. By Prof. F. Adami. (Bücher der Naturwissenschaft, herausgegeben von Prof. S. Günther.) 9 und 14 Band. Pp. 126 + 4 plates + 180 + 12 plates. (Leipzig: Philipp Reclam, jun., n.d.) Price 1.50 marks.

(1) **O**PINIONS differ as to the best mode of commencing instruction in every branch of knowledge. The correct solution of the

problem is of much importance, particularly in physics, in which subject, for some reason, students seem to find more than average difficulty. The author of this book has been convinced by his teaching experience that the most efficient method of presenting the elementary principles is by means of question and answer. His book therefore consists entirely of a long series of questions. To the more difficult of these questions answers are appended; to the easier the student is expected to supply his own answers. The subjects treated are just those usual in an elementary text-book, the greatest stress, however, being laid on mechanics, to which about half the book is devoted.

While not questioning the undoubted value of question and answer in ascertaining the progress of students, it cannot be admitted that these form the function of a text-book. Question and answer should preferably be oral; they should also be mutual as between teacher and student. As a text-book the present volume is comparatively useless, principally on account of the lack of continuity and logical order which the method of presentation involves, but as a book of examples it may prove of considerable value.

(2) The appearance of a book on radio-active measurements is very welcome. That it should come from the laboratory of Prof. Rutherford, and have for its authors two such distinguished workers on radio-activity, practically ensures its general adoption in advanced physical laboratories. It can scarcely be doubted that the authors' assurance that so many and varied exercises in radio-activity can be performed with comparatively small quantities of active material will lead to the introduction of such measurements into the laboratory courses of many honours schools in physics. Most of the experiments described are already so included in Manchester, particularly with the view of the students ultimately taking up original research in this subject.

The earlier part of the book is devoted to the theory and practical use of the electrometer and various electroscopes, and the treatment is both detailed and lucid. Much useful advice in the construction of home-made instruments is given, and the student is also told how to surmount the various difficulties which arise. Chapters iii. to vi. are devoted to the practical exercises previously referred to, the number which can be performed by means of simple apparatus being surprisingly large.

The remainder of the book is intended for original investigators rather than ordinary students. Here the methods of making accurately standard radio-active measurements and the separation of radio-active substances are treated

in considerable detail. These, together with the appendices concerning radio-active constants, ranges of particles, rates of decay, &c., cannot fail to be of the utmost use to those interested in the extension of knowledge in this sphere. Lack of space forbids as detailed a description as the work deserves, but it can be confidently stated that it will prove its own recommendation.

(3) This is the first of a series of four little books on practical physics which the author proposes to publish. It is intended to form in schools a first year's course, and deals with measurements in mechanics of solids and fluids. The instructions are given in a very clear manner, and the student is told in every case exactly how to record the results. The arrangement of the book and the diagrams are excellent, rendering it quite one of the best of its kind.

(4) This is another book on practical physics, but one of a much more extensive and advanced character. The experiments described are those on general physics and properties of matter which are suitable for the advanced classes in colleges and technical schools. A knowledge of the calculus is assumed, being used for the theoretical treatment of many of the exercises. Students are instructed in the methods of eliminating errors, and advised as to the precautions necessary to secure accurate results. The author has been very thorough in this respect, and his work compares favourably with the various standard text-books of practical physics.

(5) Here is yet another book on elementary practical physics for use in schools. The two volumes deal respectively with mechanics, and heat and light. The method adopted is to ask a series of questions, the answers to some of them depending merely on theoretical knowledge and the others involving practical observations. In all cases space is provided in the book itself for the student to record the answers and results beneath the exercise itself. This certainly seems to be carrying this method of teaching a little too far, for in the case of the slovenly student the result will be that the book will be spoilt, while to the tidy student such spoon-feeding is quite unnecessary. The instructions given are rather meagre, and no diagrams are used for purposes of illustration.

(6) Dr. Lecher's book is a simple treatise on physics specially intended for students of medicine and biology. The author has endeavoured to make the subject appeal to them by the frequent introduction of illustrations drawn from their own subjects. Naturally the book is quite elementary in character, but the scope is fairly comprehensive from a descriptive point of view. Some of the diagrams are rather old-fashioned, depicting, as

they do, persons performing experiments, but they are well and clearly printed, as is also the text.

(7) A book such as this of Dr. Houstoun's has long been needed. Many students of physics have experienced considerable difficulty both in selecting and in understanding the various treatises on mathematical physics which they ought to read. The present work will serve as an introduction to a variety of subjects, and the treatment is such that a student with a fair knowledge of the calculus and physics should be able to read it with comparative ease. The six chapters of the book deal respectively with attraction, hydrodynamics, Fourier series and the conduction of heat, wave motion, electromagnetic theory, and thermodynamics. There is also a series of examples at the end of each chapter. One is inclined to think that the section on thermodynamics is scarcely so extensive as the subject deserves, at any rate in comparison with the space devoted to the other sections. Standard works on thermodynamics are, however, more readily available to the average student; consequently this defect is less serious than it might otherwise have been.

(8) In this little popular treatise on electricity Prof. Adami manages to describe in non-mathematical language various principles in electricity and their applications to important practical developments. The book is nicely got up, and the diagrams are exceedingly well produced.

OUR BOOKSHELF.

The Electron Theory. By Prof. Toshinojo Mizuno. Pp. 336. (Tokyo: Z. P. Maruya and Co., Ltd., 1912.)

In this book, which is intended for Japanese readers, Prof. Mizuno, of Kyoto Imperial University, gives the substance of a course of lectures which he delivered in 1911 at the Kyoto summer school. Beginning with the vacuum tube discharge, the author leads his readers through the various phenomena associated with the Zeeman effect, Brownian movements, Lenard and Röntgen rays, up to the modern conceptions of the structure of the atom. In this connection the hypothetical forms of stable configurations are discussed at considerable length. There then follow fairly detailed sections on the constitution of the spectrum lines, on radio-activity, on the energy quantum theory, on the longitudinal and transverse mass of electrons, and the like. Towards the end the principle of relativity is introduced in connection with Michelson and Morley's classical experiments.

The author makes no claim to any originality of treatment; but he has made himself master of the growing literature of the subject and has endeavoured to give a connected view of the many phenomena described. He is not satisfied with